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IN THE DRAWINGS

Please amend FIG. 2 as described in the enclosed proposed drawing.

REMARKS

I. INTRODUCTION

In response to the Final Office Action dated July 12, 2007, claims 19 and 21 have been amended. Claims 1-24 remain in the application. Entry of these amendments, and re-consideration of the application, as amended, is requested.

II. ALLOWABLE SUBJECT MATTER

The Final Office Action indicates that the subject matter of claims 5, 6, 13, 14, 18, 23, and 24 would be allowable if written in independent form to include all of the limitations of the base claim and any intervening claims. The Applicants thank the Examiner for noting allowable subject matter. Should the rejection of the remaining claims be maintained, the Applicant will amend the claims accordingly.

III. CLAIM AMENDMENTS

Applicants' attorney has made amendments to the claims as indicated above. The Applicants are not conceding in this application that those claims are not patentable over the art cited by the Examiner, as the present claim amendments and cancellations are only for clarifying the language of the claims and facilitating expeditious prosecution of the allowable subject matter noted by the examiner. Applicants respectfully reserve the right to pursue these and other claims in one or more continuations and/or divisional patent applications.

IV. DRAWINGS

In paragraph [2], the Final Office Action objects to the drawings because they do not show the function of the "clocks 204A-F" in FIG. 2 as described in the specification. The Final Office Action reminds the Applicants that "Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing."

As a threshold matter, items 203A-F are not clocks, but "packetizers," which generate the data packets shown in FIG. 3A and 3B. Details regarding how the packetizers work are not essential to a proper understanding of the present invention. Nonetheless, the Applicants hereby submit amended FIG. 2.

V. NON-ART REJECTIONS

In paragraph 6, claims 19 and 21 are rejected because they recite "an equalizer" without antecedent basis. The claims erroneously cited "an equalizer" when they should have referred

to the equalizer recited in claim 17. These claims have been amended to correct this defect.

VI. STATUS OF CLAIMS

Claims 1-4, 7-12, 15-17, and 19-22 were rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Publication No. 2006/0045191 to Vasanth in view of Goldstein et al., U.S. Patent No. 6,002,713, (Goldstein).

VII. GROUNDS OF REJECTION TO BE REVIEWED

Whether claims 1-4, 7-12, 15-17 are patentable under 35 U.S.C. § 103(a) over U.S. Patent No. 2006/0045191, issued to Vasanth et al. (hereinafter, the Vasanth reference) in view of U.S. Patent No. 6,002,713, issued to Goldstein et al. (hereinafter, the Goldstein reference).

VIII. ARGUMENT

A. The References

1. The Vasanth Reference

U.S. Patent Publication 2006/0045191 discloses Parameter encoding for an improved ATSC DTV system. Transmission of a digital television signal conveys data parameters along with the encoder data that are utilized by the receiver in equalization and in decoding the encoded data. Leveraging the existing digital television standard data formatting, parameters are split between the two fields of a frame of the interlaced signal. Spread spectrum techniques are employed to robustly convey the parameters in encoded form to the receiver.

2. The Goldstein Reference

U.S. Patent 6,002,713, issued December 14, 199 to Goldstein et al. (Goldstein) discloses a PCM modem equalizer with adaptive compensation for robbed bit signalling. A PCM modem equalizer includes an RBS estimator and decision modulator in conjunction with an adaptive equalizer such as a conventional decision feedback equalizer (DFE). The RBS estimator and decision modulator receives error signals from the second summer in the equalizer, receives the estimated R signals from the first summer of the equalizer, and outputs a gain correction signal which is applied to the output of the reference generator before the reference generator output is applied to the feedback equalizer and the second summer. The methods of the invention are based on the recognition that the effects of RBS can be detected in the amplitude modulation of the main training sequence stream. The modulation will occur in a periodic repetitive pattern of length 6*T where T is the symbol interval. Therefore, the

invention applies a corrective gain to the decision in each time slot in a periodic manner having the same period 6*T. For each time interval T.sub.k over a period of 6*T, the symbol present at the time interval is sampled and a respective corrective gain g(6k-j) is applied to it, where j has the values 0 through 5. The gain applied to each of the six time slots is adaptively updated over a training period until each of the six gain coefficients is optimized.

B. Claims 1-4, 7-12, 15-17, and 19-22 are Patentable Under 35 U.S.C. § 103(a) over Vasanth in View of Goldstein.

According to the Final Office Action, Vasanth discloses:

- demodulating and decoding an input signal having input data to produce a data output (see fig. 1, demodulator 148 receives an input signal which is then decoded by decoder 152, [0017]);
- generating equalizer parameters from the pseudo-training sequence ([0026])
- equalizing the input signal according to the equalizer parameters ([0017], see equalizer in fig. 1 156)

The Applicants respectfully disagree. Paragraph [0025] and [0026] is reproduced as follows

> [0025] The received signal is demodulated by the demodulator 148 (344), and parameters are decoded by the parameter decoder 152 (348).
>
> [0026] The parameters define the number of discrete levels in the digital wireless signal conveying the bit-streams 124, 128, and are therefore used by the equalizer 156 in resolving multipath or otherwise converging the signal (352). The decoded parameters are also utilized in decoding the data bit-stream 128 (356).

Plainly, the foregoing teaches transmitting parameters to a parameter decoder that are used by the equalizer to resolve multipath issues. Transmitting the equalizer parameters to the equalizer is not analogous to transmitting a pseudo-training sequence (or even a training sequence) to the equalizer.

The Final Office Action acknowledges that Vasanth fails to disclose remodulating the data output to produce a pseudo-training sequence including an idealized input signal, but relies on Goldstein as teaching this feature. Specifically, the Final Office Action argues that Goldstein teaches "remodulating the data output to produce a pseudo-training sequence including an idealized input signal" as follows:

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> The gain coefficient applied to this symbol is selected at switch 162 which is synchronously at the same j=5 position. The gain coefficient at this position is labelled [1+g5(6k−5)] and represents the gain coefficient which will be repeatedly applied to each T(6k−5). Switch 164 represents the remodulated symbols $T^{RM}k$, each of which is calculated by multiplying the respective symbol Tj(k) by the respective gain coefficient gj(k). It will therefore be understood that the RBS estimator and decision modulator 150 will generate a repeating pattern of six gain coefficients which are synchronized with the stream of training symbols in order to adjust the amplitude of the locally generated training symbols to match the RBS-altered amplitude of the symbols in the received signal stream R. When the locally generated training symbols are so remodulated, the DFE is permitted to correctly adjust the tap coefficients by comparing the estimated signal R with the remodulated reference signal $T^{RM}k$ which has now been adjusted to compensate for the effects of RBS on the estimated signal R. Therefore, the tap coefficients for the symbols which have been affected by RBS are set differently than they would have been set were it not for the remodulation of the locally generated training symbols.

The Applicant acknowledges that the foregoing passage uses the term "remodulated symbols," but the meaning of "remodulation" in the Goldstein reference is apparently different than the meaning of "remodulation" as used in the Applicants claim. As is apparent from FIG. 13 of the Applicants' disclosure, the remodulator 1310 reproduces the signal $\hat{s}(t)$ delayed by the a time factor τ (in other words, $\hat{s}(t-\tau)$). In essence, it "re-modulates" what was "demodulated" in the first step of claim 1.

The Applicants are not sure why the Goldstein reference uses the term "remodulate" when referring to the operations performed in RBS estimator and decision modulator 150. Regardless, it is clear that RBS estimator and decision modulator 150 does not *re*-modulate a signal that was *de*modulated as described in claim 1.

The Goldstein reference is directed to a solution to the narrow problem of minimizing the effect of robbed bit signalling (RBS) introduced into digital data. RBS refers to a technique where the least significant bit of each nth data socket is replaced with a control bit that is used for control signalling (col. 2, lines 20-50). This RBS creates significant problems for equalization, since it is impossible to know whether the symbol has been impaired due to RBS. (col. 2, lines 51-56). The solution to this problem is the use of the RBS estimator and decision modulator 150 shown below.

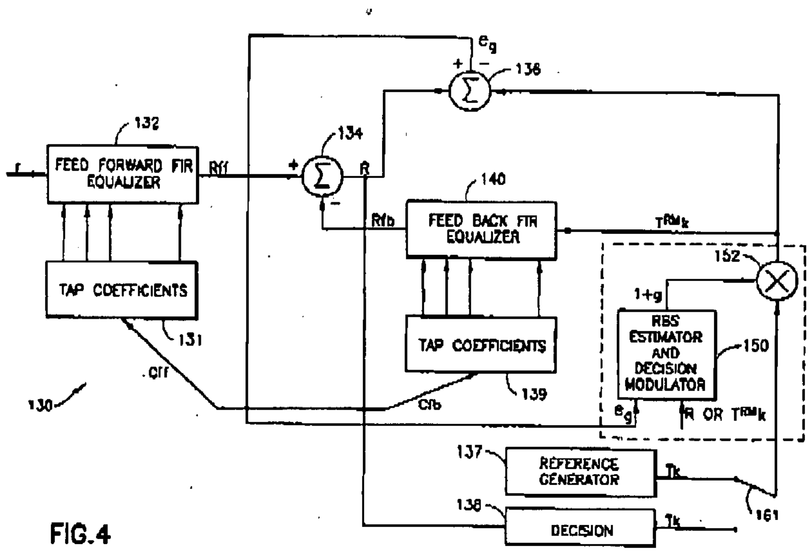

FIG.4

Goldstein describes that his invention is based upon the notion that one can amplitude "modulate" the training sequence stream by multiplying the training sequence T_k (or presumably, the output of the decision block) by a gain factor. This is described below:

> RBS estimate and decision modulator. The methods of the invention are based on the recognition that the effects of RBS can be detected in the amplitude modulation of the main training sequence stream. The modulation will occur in a periodic repetitive pattern of length 6*T where T is the symbol interval. Therefore, the invention applies a corrective gain to the decision in each time slot in a periodic manner having the same period 6*T. More particularly, for each time interval T_k over a period of 6*T, the symbol present at the time interval is sampled and a respective corrective gain g(6k−j) is applied to it, where j has the values 0 through 5. The gain applied to each of the six time slots is adaptively updated over a training period until each of the six gain coefficients is optimized.

and is shown in FIG. 6, reproduced below.

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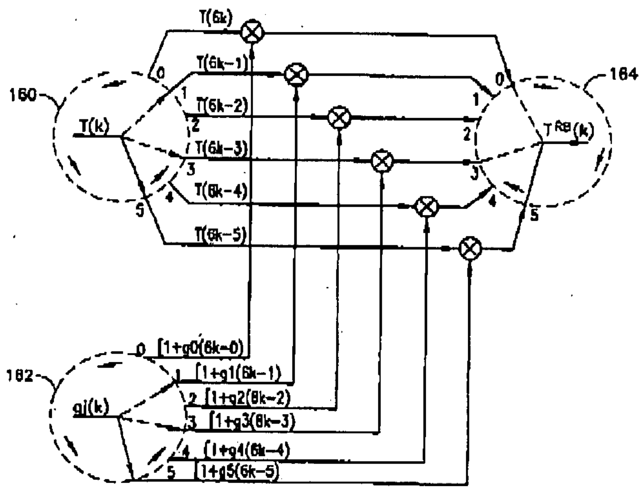

FIG.5

and discussed below:

> The gain coefficient applied to this symbol is selected at switch **162** which is synchronously at the same j=5 position. The gain coefficient at this position is labelled [1+g5(6k−5)] and represents the gain coefficient which will be repeatedly applied to each T(6k−5). Switch **164** represents the remodulated symbols $T^{RM}k$, each of which is calculated by multiplying the respective symbol Tj(k) by the respective gain coefficient gj(k). It will therefore be understood that the RBS estimator and decision modulator **150** will generate a repeating pattern of six gain coefficients which are synchronized with the stream of training symbols in order to adjust the amplitude of the locally generated training symbols to match the RBS-altered amplitude of the symbols in the received signal stream R. When the locally generated training symbols are so remodulated, the DFE is permitted to correctly adjust the tap coefficients by comparing the estimated signal R with the remodulated reference signal $T^{RM}k$ which has now been adjusted to compensate for the effects of RBS on the estimated signal R. Therefore, the tap coefficients for the symbols which have been affected by RBS are set differently than they would have been set were it not for the remodulation of the locally generated training symbols.

This would appear to mimic the periodicity of the RBS, and hence, somehow assist in accounting for the RBS in the determining of equalization parameters. However, while Goldstein teaches modulating the decision using the system shown and described in FIG. 5, it does not appear to *re*modulate anything (Goldstein appears to be silent in terms of how the

underlying signal was modulated in the first place). It is also important to note that claim 1 recites that the product of the remodulation process is to produce a pseudo training sequence that includes *an idealized input signal* (which was demodulated and decoded in previous operations). Whatever can be said about the signal emanating from the RBS estimator and decision modulator 150, it cannot be said to produce an idealized input signal that was demodulated and decoded in the receiver. Instead, the signal appears to modulate the reference or decision symbols by a variable gain. Hence, the output cannot be an idealized input signal (before demodulation and remodulation), as recited in claim 1/

Finally, Goldstein is directed at solving a problem having to do with RBS ... an error of apparently known periodicity and signal characteristics ... and to solve that problem, Goldstein generates an analogous error signal at the receiver, modulates *by* that error signal (not by the same technique used to generate the signal that was received in the first place).

<u>With Respect to Claim 2, 10, 19, 20, 21, and 22</u>: Claim 2 recites:

> *The method of claim 1, wherein the step of generating equalizer parameters from the remodulated data output comprises the steps of:*
> *buffering the input signal; and*
> *comparing the buffered input signal to the pseudo-training sequence to produce the equalizer parameters.*

According to the Final Office Action, these features are disclosed in the Goldstein reference as follows:

> reference generator is utilized to provide Tk). The output decisions Tk are multiplied by the output (1+g) of the RBS estimator and decision modulator **250** to provide remodulated symbols T^{RM}_k. Differences between the remodulated symbols (T^{RM}_k) and the estimated symbols (R) are taken at the summation block **236** to generate error values (e_g), and the error values are fed back to the adaptive equalizer **201** and the RBS estimator and decision modulator **250**. As can be seen from FIG. 7 (as well as FIGS. 4–6), the RBS estimator and decision modulator **250** utilizes the error values (e_g) as well as either the estimated symbols (R) or the remodulated symbols $T^{RM}k$ in generating a gain (g).

The Applicants, however, do not see where buffering is disclosed in the foregoing passage. Accordingly, the Applicants respectfully traverse. Claims 10, 19, 20, 21, and 22 recite analogous features and are patentable for the same reasons.

<u>With Respect to Claims 4 and 12</u>: Claim 4 recites:

> *The method of claim 3, wherein the step of remodulating the data output to produce a pseudo-training sequence comprises the steps of:*
> *re-encoding the received data signal to produce a re-encoded signal; and*

remodulating the encoded signal to produce the pseudo-training sequence.

According to the Final Office Action the following passage of Goldstein discloses re-encoding and remodulating the re-encoded signal.

> coefficient gj(k). It will therefore be understood that the RBS estimator and decision modulator **150** will generate a repeating pattern of six gain coefficients which are synchronized with the stream of training symbols in order to adjust the amplitude of the locally generated training symbols to match the RBS-altered amplitude of the symbols in the received signal stream R. When the locally generated training symbols are so remodulated, the DFE is permitted to correctly adjust the tap coefficients by comparing the estimated signal R with the remodulated reference signal $T^{RM}k$ which has now been adjusted to compensate for the effects of RBS on the estimated signal R. Therefore, the tap coefficients for the symbols which have been affected by RBS are set differently than they would have been set were it not for the remodulation of the locally generated training symbols.

However, the Applicants do not see how the foregoing passage discloses re-encoding and remodulating. Accordingly, the Applicants respectfully traverse. Claim 12 recites analogous features and is patentable for the same reasons.

<u>With Respect to Claims 8 and 16</u>: Claims 8 and 16 recite buffering the equalized signal and comparing the buffered equalized input signal to the remodulated data output to produce the equalizer parameters. As described above, the recited portion of the Goldstein reference do not disclose this feature. Accordingly, the Applicants respectfully traverse.

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IX. CONCLUSION

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Should any fees be associated with this submission, the Commissioner is authorized to charge Deposit Account 50-0383.

Respectfully submitted,

Date: September 12, 2007

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